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# Cultivating Change: A Prairie Guide to Sustainability Teaching and Learning Practices





# **CULTIVATING CHANGE: A PRAIRIE GUIDE TO SUSTAINABILITY TEACHING AND LEARNING PRACTICES**

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# CHAPTER 1 TEACHING SUSTAINABLE FACULTY FELLOWS PROGRAM EXPLAINED

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## Teaching Sustainable Faculty Fellows Program Explained

When I, Aditi, joined the Gwenna Moss Centre for Teaching and Learning at the University of Saskatchewan (USask) in 2019, my new colleague Heather Ross was quick to share the benefits of Open Educational Practices. I immediately saw how the teaching and learning process benefits when educators and students share and collaborate.

Within a few months, she identified my passion for outdoor and environmental education, including education for sustainable development, particularly through the 17 United Nations Sustainable Development Goals (SDGs). While education for sustainable development was not part of my assigned duties at the time, Heather is a connector in the world of Open Educational Practices, so she quickly shared a link to the Kwantlen Polytechnic University SDGs Open Pedagogy Fellowship. In this program, educators from around the world work together to develop open learning activities for their students and share their impact at the end of

the year. I was interested but had other priorities at the time.

When education for sustainable development became a larger part of my assigned duties in 2021, Heather and I began to explore what role faculty leaders might serve at our own institution and what impact we wanted them to have. We admired Kwantlen Polytechnic University's engagement with international partners; however, we were more interested in amplifying our own educators' practices in education for sustainable development.

I interviewed over 30 USask educators who were known to use high-impact teaching practices toward sustainability. These experts described five teaching practices that resulted in students who "got it," students they felt would continue to be sustainability practitioners beyond their credentials:

- Prioritizing student agency
- Changing mind, heart, and skill sets
- Designing reflective practices
- Leveraging interdisciplinary relations
- Fostering community connections

Toward that end, I developed a "wraparound" module (Learning for Sustainability) that any educator could use to reflect on a wide range of learning activities related to sustainability. However, to change hearts and minds, we had to create connections to land, stories, and time. The USask experts I interviewed were clear that ambitious teaching requires ongoing persistence and the fostering of relationships inside and outside the classroom. The instructors I interviewed were seen as friendly neighbours in their units who were experts in their



domain, but perhaps not as influencers and leaders from whom others could learn.

In the past, the Gwenna Moss Centre had supported intensive communities of practice focused on course development or learning innovation; however, these communities were only for individuals and were not intended to create systemic change. Thus, Heather and I began envisioning a program to fill this gap. We defined our ideal participant in a brief “in search of” statement:

Academic units that are willing to adopt broader change with the help of an appointed Sustainability Faculty Fellow in the domains of education for sustainable development and Open Educational Practices.

The Sustainability Faculty Fellow is an individual who

- can meet commitments;
- wants to embed Open Educational Practices and sustainability within their own course such that students are taking action toward sustainability and the SDGs;
- is supported by academic leadership and their academic unit to pursue this work; and
- demonstrates qualities of an amplifier:
  - clear personal philosophy on their teaching beliefs and can describe their positionality
  - empathy for the lived realities of others
  - ability to have difficult conversations with peers
  - open to new ways of doing and being.

The Sustainability Faculty Fellow wishes to do the following:

- Develop their academic leadership skills
- Act on internal motivations for a more sustainable and just world
- Bridge their teaching and scholarship
- Engage with a community of practice.

We were looking for educators who wanted to make a difference beyond their own classroom but who maybe didn't yet feel like experts in teaching for sustainability. We thought participating in this fellowship would help educators find peers with whom they could share ideas about how they grew their teaching skills. They could support each other as they incorporated sustainability into their courses and show others that change was achievable. They would also need strong support from academic leaders in their units if they were to influence policy or practice across many courses. We realized that to achieve this, the fellowship process would need to be at least two years—one year for the Sustainability Faculty Fellows to try new teaching strategies and another year to activate change across their units. That is how the two-year Sustainability Faculty Fellows program was born.

It is one thing to have desired outcomes and another to achieve the desired impact. We brainstormed a set of learning outcomes for the Sustainability Faculty Fellows and the evidence we would look for to indicate that they were making progress. Some of these ideas have been realized, and the fellows have also found other ways to articulate their growth. This illustrates agency and voice

in the Sustainability Faculty Fellows—they were able to step out of their roles as participants in the fellowship and see how they could lead this type of collaboration both with their own students and with colleagues.

Following are some of the learning outcomes we identified when brainstorming and examples of evidence that would indicate progress.

Learning outcomes	Examples of evidence of progress
Align learning outcomes related to sustainability, assessment, activities, and teaching strategies within one's course design	<ul style="list-style-type: none"><li>• Syllabus and course design that articulate activities (ideally experiential), outcomes, and assessments (including reflection and feedback) related to sustainability</li></ul>
Justify one's disciplinary contribution to sustainability and the SDGs	<ul style="list-style-type: none"><li>• Open Educational Practices resource in development</li><li>• Conversations with community and industry partners</li><li>• Relevant SDGs identified in syllabus</li></ul>
Model and encourage perspective taking on sustainability issues by both students and colleagues	<ul style="list-style-type: none"><li>• Activity on perspective taking implemented in the classroom</li><li>• Activity on perspective taking implemented with colleagues</li></ul>
Model and encourage students in selecting effective technologies to exchange ideas, facts, and perspectives about sustainability with others in their course or beyond	<ul style="list-style-type: none"><li>• Activities where students select the tool based on the context or need</li><li>• Peer review (new template) or other conversations about teaching</li></ul>
Model and encourage peers in selecting effective technologies to exchange ideas, facts, and perspectives about sustainability with others beyond their courses	

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Collaborate with diverse groups or sectors on approaches to sustainability

- Community partners identified
  - Inter-institutional partners identified
- 

Integrate learning activities where students will apply adaptive design, system thinking, and problem-solving to sustainability problems

- Syllabus with explicit description of course design leading to sustainability
  - Contribution of sample activities to this guide (see following chapters)
- 

Create opportunities for students to reflect, share, and act on sustainability issues through Open Educational Practices by considering impacts on personal resilience and the 5P Framework of People, Planet, Prosperity, Peace, Partnership

- Syllabus and course design (assignments, connections to experiential learning, good questions for students to reflect upon)
- 

Support colleagues in using technologies for good course design that integrate sustainability

- Feedback from departments
  - Survey of staff, faculty, and students
  - Results from Usask Student Learning Experience Questionnaire
  - Reciprocal peer review of teaching and learning
- 

The USask Sustainability Faculty Fellows program began with a foundation of over 30 hours of professional development from May to August 2022. The purpose was

to set the tone for what the next two years would entail. These beginning steps included

- a bus tour of our city to connect with land and community,
- a virtual book club reading of *Braiding Sweetgrass* by Robin Wall Kimmerer, and
- many other experiences that the fellows discuss in Section III, “How Can This Be Done?”

Then we let our fledglings fly for their first semester of teaching for sustainability (September to December 2022).

We initiated pre-course and post-course surveys to determine if the teaching practices used by the fellows were helping students

- reflect, share, and act on sustainability;
- communicate meaningfully about sustainability; and
- cultivate confidence toward learning for sustainability.

A total of 265 students in six courses (from 200- to 400-level) across five colleges experienced learning for sustainability embedded with the fellows in fall 2022. Of these, 135 students responded to the pre-course survey and 114 students responded to the post-course survey.

Approximately 10 students (3.8%) withdrew or achieved a grade less than 50% overall. Campus-wide, 11.7% of undergraduate students withdrew or achieved a grade less than 50%. There is little known about correlation or causation in this; however, it does suggest that high-

impact teaching practices resulted in a greater percentage of students experiencing success.

Overall, students said they had been successful in their course and that learning about, and even taking action upon, the SDGs can help them advance their professional and disciplinary expertise.

**Table 1:** Student responses to the pre-course survey ( $n = 135$ ) and the post-course survey ( $n = 114$ ). Students were given slider scales with a range from 0% to 100% to respond to the survey questions.

Survey Question	Pre-course average (%)	Post-course average (%)	Change (percentage points)
How confident are you in communicating meaningfully about sustainability?	54	72	+18
How confident are you in nurturing relationships and managing conflict to achieve sustainable solutions?	58	67	+9
How confident are you in leveraging technology (digital tools or systems) to achieve sustainable solutions?	54	63	+9
How confident are you in being able to find creative solutions to complex sustainability problems in your discipline?	54	68	+14
How knowledgeable are you about cultural norms of different groups with whom you work/study?	53	67	+14
When reflecting on the challenges facing people and the planet, how do you feel about your ability to be the change the world needs?	56	66	+10



**Table 2:** Student responses to the question “Have you experienced sustainability education as a student?”

Surveyed group	No (%)	Yes (%)	Not sure (%)
Students who responded to the pre-course survey (n = 135)	32	29	39
Students who responded to the post-course survey (n = 114)	4	88	9

Following are some of the comments from students in the post-course survey:

- Now that I understand the definition of sustainability more, I am confident in my abilities to contribute to the SDGs. I feel that a better understanding of the SDGs will allow me to be prosperous in my personal, work, and economic life, as well as educate others on the importance as well.
- I have learned so much how kinesiology can influence sustainability through so much more than just good health and well-being. While it obviously has a strong connection with good health and well-being, this SDG is closely related to many other SDGs such as sustainable cities and communities, infrastructure, reduced inequalities, life on land, climate action, quality education, and institutions. They are all interconnected and there are small solutions that everyone can take part in to promote sustainability throughout the world.
- I learned from this course about the potential to have sustainable farming. For awhile I believed [it] was a myth or something for the future to find out.

It just happens that we are that future, we can provide sustainable agricultural practices.

- A better understanding of the micro components that need to be focused on [if] you want the macro visual effect of sustainability.
- I gained confidence to talk about any form of planetary issues that can affect human health with solutions for a healthy environment.

The goal of all education for sustainable development is simple—we want students to have the competencies to address the planet's greatest issues. Most students will only develop these competencies if they practise them, get feedback on them, and reflect on them throughout a program of study. Sustainability Faculty Fellows are an example of embedded experts who can support students in this learning.

The fellows are also experts among their peers and can help those peers advance their own education toward sustainable development teaching and learning goals. This is an extension of Vygotsky's concept of the zone of proximal development. When a learner is close to mastering something but still needs the guidance of an expert, they are in their zone of proximal development. As the "more knowledgeable others" among their peers, the Sustainability Faculty Fellows can provide instruction and support and will be valued and appreciated.

Our goal for the second year of the fellowship (currently underway) is to help Sustainability Faculty Fellows

- describe the value of education for sustainable development to their peers,

- influence peers or coach them to develop capacity, and
- work to embed the SDGs across the curriculum.

Ideally, we will see more

- students reflecting on sustainability competencies,
- embedded opportunities for acting on the SDGs, and
- changes in unit culture.

We are excited to work with Sustainability Faculty Fellows to “bring it all together” over this year, and to see the lasting impact they will have on USask students for a regenerative future.

## CHAPTER 2 WHY SUSTAINABILITY IN TEACHING AND LEARNING?

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### Why Sustainability in Teaching and Learning?

#### University Priorities

This section is adapted from “Rationale” in *Embedding Sustainable Development Goals in Teaching and Learning*, by Aditi Garg, published by the University of Saskatchewan in 2023. Its purpose is to provide the context and rationale for the Sustainability Faculty Fellows program.

#### Where

As an institution with a settler-colonial history, we work through *nākatēyitamowin* / *nakaatayihthaamoowin* (University of Saskatchewan, 2018b), a principle of sustainability intended to protect and honour the wellness of all humanity and creation across Treaty 6 and the Homeland of the Métis. It is through relationships that we all advance the United Nations Sustainable Development Goals (SDGs).

While this book is available to anyone, strategic

references are made to actions on this land. You are encouraged to connect with your own land's history and stories. To find out who the Indigenous Peoples of your land are, you can visit the Native Land app. This will help you better reflect how local actions toward the SDGs can have global impact.

## Why

In its strategic plan, USask commits to being “The University the World Needs.” Achieving this places a high priority on the SDGs. As the plan articulates, “Only by addressing the interlinked social, economic and environmental challenges captured by the SDGs will it be possible to tackle climate change and protect the planet, while at the same time creating a prosperous, just and equitable society” (University of Saskatchewan, 2018a, para. 1).

## What

Sustainability in teaching and learning, or education for sustainable development, is the deliberate construction of learning experiences—across disciplines—so that graduates can demonstrate proficiency in competencies for a sustainable future. Learning for sustainability is reflected in core competencies that encompass the knowledge, skills, and attitudes necessary to transform systems as required for a regenerative future.<sup>1</sup>

Reliable learning for sustainability includes the following:

- Course outcomes that focus on competencies

- Instructional design that centres students' agency to reflect, share, and act
- Progression in abilities due to iterative practice and feedback
- Assessment of students' competencies

USask must commit to deliberately designing courses and programs to systematically build sustainability competencies in our students.

## Students See Value in Learning for Sustainability

Many students view learning for sustainability as an opportunity to develop higher-order thinking skills. Reflecting, sharing, and acting on sustainability can “help things stick” (Whalen & Paez, 2021, p. 117). In the 2022 global *Skills for Sustainability* survey of science and engineering students, 59% of survey respondents felt that projects and activities related to the SDGs were useful for addressing sustainability, yet only 30% had learned about the SDGs. Respondents identified that a sustainability mindset and experience with critical thinking and creativity were most important for addressing challenges related to a sustainable future. Students and recent graduates identified empathy as one of the most important traits of a sustainability practitioner (Siemens DISW, 2023).

Empathy—to understand and share the feelings of another—can be described as the heart of sustainability. Thus, we present the heart set, mindset, and skill set as the three domains for successful teaching and learning

in sustainability. These are nested within each other—the heart changes the mind, which directs the hands (skills).

## Student Competencies

Students come to higher education with a wide range of experiences and prior knowledge—students are not empty vessels to be filled. Lev Vygotsky’s theory instructs us to build on what they know. Constructivism, building on prior knowledge within one’s zone of proximal development (see Chapter 1), is necessary because of the complexity of learning for sustainability (Armstrong, 2015).

Sustainability, the resilience of our ecosystems, is built on systems thinking and the interplay of interdisciplinarity. Key sustainability competencies provide an “ambitious knowledge and skill profile” in a “constellation of values, abilities, attitudes, knowledge, understanding, mastery and habits of mind and body that are functionally linked to support critical, open-minded, future-oriented and global forms of thinking and being that evoke purposeful behaviour towards sustainability goals for a resilient society” (Pacis & VanWynsberghe, 2020, p. 578).

At USask, this galaxy of possibilities has been distilled into six competencies. Here are proposed criteria for how a student may demonstrate that they are developing capacity. To help us assess the Sustainability Faculty Fellows program, students were asked to reflect before and after their course experiences on how they perceived their capacity in the following six

competencies (see also Table 1 in Chapter 1 for student ratings).



Competencies for sustainability	As a new graduate, I can...
Communicating meaningfully	<ul style="list-style-type: none"><li>• Listen attentively and thoughtfully engage with alternate, divergent, or contradictory viewpoints or ideas.</li><li>• Develop the ability to write and speak persuasively, tailoring a message on sustainability to specific audiences.</li></ul>
Engaging in our intercultural society	<ul style="list-style-type: none"><li>• Effectively navigate cultural differences in both verbal and nonverbal communication to foster a shared understanding and collaboration toward sustainability.</li><li>• Develop advanced scenarios, forecasts, and visions to address complex sustainability issues and anticipate the needs of diverse stakeholders over extended time periods (50 to 100 years).</li><li>• Conduct stakeholder engagement in challenging and high-risk situations that demand negotiation and conflict resolution skills.</li></ul>

Nurturing  
successful  
relationships

- Create solutions that are environmentally friendly and socially responsible.
  - Consider long-term impact on the community and the planet.
  - Anticipate, recognize, and address diverse perspectives while solving problems.
  - Adapt problem-solving approaches to accommodate various viewpoints.
  - Set challenging and achievable goals for both teams and individuals.
  - Regularly evaluate progress and provide constructive feedback.
  - Engage in self-reflection to identify areas for personal growth.
- 

Leveraging  
technology

- Design innovative technology to solve sustainability challenges.
  - Create systems and models for simulating dynamic developments in various systems and problem-solving.
  - Use technology to contribute to a regenerative society, economy, and environment.
-

Using adaptive design and problem-solving	<ul style="list-style-type: none"><li>• Use my existing knowledge and abilities to come up with original solutions.</li><li>• Apply what I've learned in one situation to solve sustainability challenges in new and unique ways.</li><li>• Identify and address problems related to sustainability with practical and effective solutions.</li><li>• Analyze complex sustainability problems comprehensively.</li><li>• Evaluate various factors and consider different perspectives.</li><li>• Create effective plans and interventions based on my assessments.</li><li>• Design strategies that will lead to regenerative outcomes.</li></ul>
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Cultivating well-being	<ul style="list-style-type: none"><li>• Embrace experimentation. I am willing to try new and untested strategies, even if they carry some risk. I can learn from both successes and failures.</li><li>• Adapt to change. I can anticipate and proactively plan for changes in various situations or circumstances.</li></ul>
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Language adapted from Association of American Colleges and Universities (2009), UNESCO (2017), UNESCO (2018), Wiek et al. (2016).

Criteria simplified and clarified for the university context using OpenAI (2023).

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## Notes

1. These are described through the six USask undergraduate competencies in the table to follow.

## CHAPTER 3 DESIGNING A COURSE THAT INTEGRATES THE SUSTAINABLE DEVELOPMENT GOALS

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### Designing a Course That Integrates the Sustainable Development Goals

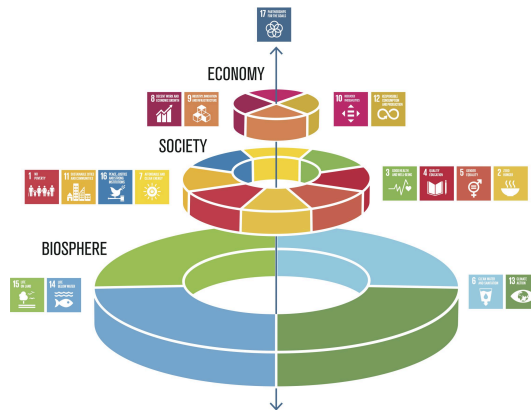
#### What Are the Sustainable Development Goals?

This section is adapted from “What Are the SDGs?” in *Embedding Sustainable Development Goals in Teaching and Learning* by Aditi Garg, published by the University of Saskatchewan in 2023.



The Sustainable Development Goals (SDGs) address complex and interlinked social and environmental challenges. They came into effect on January 1, 2016, following a historic United Nations Summit in September 2015. The SDGs are a call to action for all countries to mobilize efforts to end poverty, fight inequalities, and tackle climate change, while ensuring that no one is left behind.

The 17 SDGs also fit within the 5P Framework—People, Planet, Prosperity, Peace, and Partnership. The *planet* provides a place for *people* to live in *prosperity* through *partnership* and *peace*. This relationship and interdependence is evident in the “wedding cake” model from the Stockholm Resilience Centre, Stockholm University. Partnerships are needed throughout the three levels (economy, society, biosphere) to advance the goals.



For each of the 17 goals, there is a list of specific targets we aim to reach. For a more detailed list of all 169 targets, visit [GlobalGoals.org](https://www.globalgoals.org).

In the previous chapter, we talked about how meeting the “interlinked social, economic and environmental challenges captured by the SDGs” has been identified by the University of Saskatchewan (USask) as being consistent with the university’s commitment to be “The University the World Needs” (see the University Plan 2025). In subsequent chapters, you will see several examples of how USask instructors have integrated the SDGs into their courses.

Often when instructors set out to integrate changes into their courses (including changes related to institutional, college, or department priorities), they will have many questions:

- Why should I do this?
- Why should I do it this way?
- How can I do this?
- What will this look like for students? What will it



look like for me as the instructor?

- What resources will I need?

This chapter tries to answer these and other “why,” “how,” and “what” questions related to designing courses that integrate the SDGs. At the end of the chapter, we provide links to additional resources related to the concepts covered here.

Before you dive into the course design information, please note the following:

- Sustainability is a strategic priority at USask, within which is articulated a need to meet the SDGs. Other strategic priorities include Indigenization and reconciliation; experiential learning; equity, diversity, and inclusion (EDI); and wellness. If you're not at USask, your institution may have different priorities.
- This chapter is not a comprehensive course design guide. Additional course design resources are available on the the Gwenna Moss Centre for Teaching and Learning website. If you're at USask, you can contact the Gwenna Moss Centre to ask about workshops or to arrange an individual consultation. If you're not at USask, your institution may have a teaching and learning centre that offers these services.
- While focusing on the SDGs, this course design information could also be used to embed other important topics and concepts into your courses.
- You may not have enough time and support from your institution, college, or department to make large changes to your course(s). Even small changes can make a difference.

## Why?

### Why Integrate the SDGs Into Your Course(s)

If you're reading this book, you may already be interested in integrating the SDGs into your course(s). If you're not convinced, or you need help convincing your colleagues to support this change, here are several reasons you should integrate the SDGs into your course(s):

- The SDGs address some of the major problems facing the world today—climate change, inequality in education and economic conditions, food insecurity, and political polarization. (See the table of competencies for sustainability in Chapter 2.)
- Students care about these issues, so including them in your course(s) will increase student engagement and empower them, two things that will benefit their wellness and improve the teaching and learning experience for both you and them.
- The problems addressed by the SDGs are happening now and are in the news every day. Tying coursework to current events keeps content fresh, increases student engagement, and may reduce incidents of academic misconduct (it is harder to plagiarize information about a current event compared to an older text that has been cited extensively). This enriches learning for the student and the educator.

## Why Students Should Take Your Course(s)

This is an important question to ask before you start to design your course(s). Consider how each course fits into a larger program or complements other courses the students may take. How will students use what they learn from you in other courses, in their careers, in their communities, and in their lives overall? Your answers will help shape the course's learning outcomes, assessments, and teaching strategies.

## Why You Should Use a Course Design Process

An intentional course design process, such as the one at USask, is essential for several reasons.

A process like this ensures the course structure and content are carefully thought out and align with the desired learning outcomes. This alignment enhances the overall learning experience for students, making the course more engaging, relevant, and effective.

Additionally, an intentional course design process supports student wellness by incorporating strategies that promote a positive and supportive learning environment. When instructors consider diverse learning styles, incorporate inclusive teaching practices, and foster a sense of belonging, students are more likely to thrive academically and personally.

For instructors, an intentional course design process provides a framework for effective teaching. It helps them organize and structure their course materials, activities, and assessments to maximize student learning while minimizing workload. Instructors can

streamline their teaching practices and create a balanced workload by incorporating evidence-based instructional strategies and leveraging technology appropriately. This, in turn, supports instructors' wellness by reducing stress and enabling them to focus on meaningful engagement with students.

**Supporting student and instructor wellness.** The information and ideas in this book are meant to help instructors incorporate sustainability into their courses without creating insurmountable work for themselves. The framework will also help instructors integrate the SDGs with a wellness factor. The “why, how, what” course design process described below is intended to support student wellness and academic success while also supporting instructor wellness.

Why is student wellness crucial for achieving academic success and preparing students for their desired post-university success? Student wellness plays a pivotal role in both academic and post-university success. Integrating student wellness into course design and prioritizing it throughout university creates an environment that supports academic achievement and personal growth and sets the stage for students' future success.

Mental and physical well-being significantly impacts students' cognitive abilities, motivation, and overall engagement in their studies. When students feel supported, emotionally balanced, and healthy, they are more likely to effectively manage stress, concentrate on their studies, and actively participate in the learning process.

Students who develop healthy habits and self-care practices during their university years are better

equipped to navigate challenges, manage work-life balance, and sustain well-being beyond university. By fostering wellness, universities prepare students academically and equip them with the skills and mindset necessary to thrive personally and professionally beyond academia.

**Building relationships.** Being intentional about building relationships in course design is of utmost importance as it fosters a sense of connection, trust, and engagement between instructors and students.

When educators invest time in understanding their students' needs and interests while designing the course, they can tailor the content to be more relevant and meaningful. This intentional approach enhances the learning experience and encourages students to actively participate, seek guidance, and collaborate with their peers.

Strong relationships in the learning environment create a safe space for students to share their thoughts and concerns, ultimately leading to better academic performance and overall well-being.

## How?

In this section, you will find instructions, ideas, and examples to help you integrate the SDGs into your course(s). We will look at some of the practical work needed to design an engaging and effective course that integrates the SDGs. The main areas that we will explore are:

- Constructive alignment

- Learning outcomes
- Assessments
- Teaching strategies

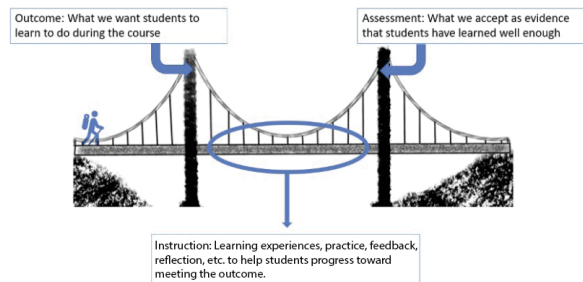
## How to Use Constructive Alignment

Constructive alignment is a principle used to design your courses so that the learning outcomes, assessments, and teaching strategies align. The planning process begins with the desired learning outcomes, then considers the ways students can demonstrate that they have achieved those outcomes (assessments). Once you have defined these two elements, you can develop teaching strategies (activities) that will give students the knowledge and experience they need to progress toward the stated outcomes and successfully complete the course.

The video “Constructive Alignment,” from the Gwenna Moss Centre's YouTube channel (GMCTL USask), explains the concept in greater detail.

The figure below shows the course as a bridge—imagine a student preparing to walk across it. For the learner to successfully cross the bridge, from the start of the course until they use what they learn in the course, there needs to be alignment. The instructor designs the bridge before the course commences, assuring an aligned and structurally sound journey, given known variables. Using sustainability as a consistent element or theme in your course can help lay the deck of the bridge for a more navigable crossing.

## Constructive Alignment



In the following sections, we will provide more information about writing defined outcomes and selecting assessments and teaching strategies.

## How to Write Learning Outcomes

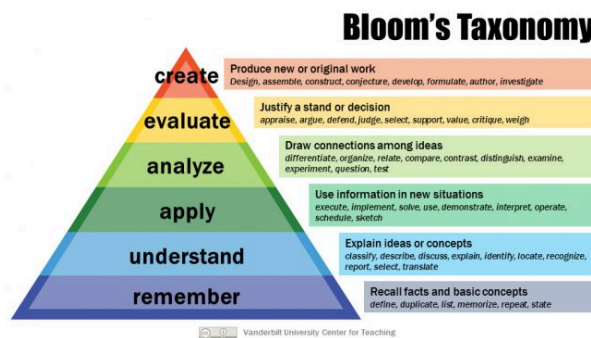
Learning outcomes are the first component of constructive alignment. They describe the knowledge and skills you want students to be able to demonstrate by the end of the course. Often instructors begin their course design with the topics they want to cover, but when you start by defining the learning outcomes, you shift the focus from the instructor to the learner.

Effective learning outcomes have three parts:

- **Performance:** “By the end of the course, students should be able to ...”
- **Condition:** The condition, circumstance, or environment in which student learning will occur or be demonstrated (e.g., in a classroom or lab, on a project or exam, given specific equipment or resources)

- Criteria: The type, quantity, quality/standard, accuracy, degree, completion time

You might choose learning outcomes that use “action words” (or verbs) coordinating with one or more of the levels in Bloom’s Taxonomy, a hierarchical classification system that categorizes learning objectives by level of complexity. Draw on higher-order cognitive tasks (create/evaluate), which align with higher-impact instructional approaches.



While assessment and instructional approaches are discrete from the outcome, as part of conductive alignment you will likely want to pause and consider what evidence you will have that students are learning and what strategies you will use to get there. Use an assignment guide to align purpose, task, criteria for assessment, and other inclusive priorities. We also recommend that you review other USask principles of assessment and strategies when drafting outcomes during course design.

## How to Align Learning Outcomes With the



## SDGs

This section is adapted from “Writing Learning Outcomes With the SDGs” in *Embedding Sustainable Development Goals in Teaching and Learning* by Aditi Garg, published by the University of Saskatchewan in 2023.

The United Nations Educational, Scientific and Cultural Organization (UNESCO) has already written learning objectives for the SDGs. However, you may wish to align these more closely with your own course or program outcomes.

For example:

Original math learning outcome: Support a position or decision relevant to self, family, or community by analyzing statistical data, as well as considering other facts. (Math Foundations 20, Saskatchewan).

+

SDGs learning outcome: Learners will be able to communicate about issues of health, including sexual and reproductive health... and prevention strategies. (Goal 3, Good Health and Well-being)

=

SDG + math outcome: Learners will be able to support a position regarding health to community by analyzing and communicating statistical data.

## How to Develop Assessments

Assessments measure student progress in achieving the learning outcomes. Simply tracking student attendance doesn't measure student progress toward outcomes.

What you assess and the type of assessment you use

should directly align with the learning outcomes. For example, suppose a course outcome is that students will be able to explain how water insecurity affects the ability of girls in remote regions of Guatemala to attend school. A multiple-choice quiz may not be the best way to measure progress on that outcome, as the responses will likely lack nuance. A presentation, debate, or paper is likely a better measure of student progress. For example, a Collaborative Online International Learning experience partnered with university students in Guatemala, in which students prepare a presentation, would likely yield a rich learning experience.

**Summative and formative assessments.** Summative assessments, given at the end of a course with no feedback or opportunity for improvement, are what most people think of when they think about assessment. When students complete a traditional summative assessment, they usually receive a grade with minimal feedback, so the stakes are higher than other types of assessment where feedback and more opportunities to improve exist. Thus, summative assessments should come after opportunities to learn and improve through practice and feedback.

There are many types of summative assessments to choose from. The following is not a complete list, but it should give you some ideas. You can find additional ideas in the resources listed at the end of this chapter.

- 
- Essay
  - Debate
  - Presentation
  - Editing Wikipedia articles
  - Laboratory experiment
  - Podcast or video creation
  - Project planning as a team
  - Fieldwork
  - Poster
  - Creating or contributing to learning materials
  - Multiple-choice test
  - Analysis of a journal article or open textbook chapter
  - Creating a marketing plan for a real nonprofit organization
  - Creating a piece of art or other artifact that reflects the aim of one or more outcomes
- 

In some cases, depending on the discipline, class size, and learning outcomes, some of these may be considered authentic assessments (more on this in the next section). Also, many of these can be done by students individually or in groups.

Formative assessments are opportunities for you and your students to determine how well the learning process is going and for students to practise and learn in a low-stakes environment. For example, having students submit a draft version of a paper to receive feedback from the instructor, teaching assistant, or a fellow student with no grade attached allows them to learn from the process and apply that learning to a final version (a summative assessment) that will be graded. Other types of formative assessment and feedback include using a student response system (a tool that allows students to respond to instructor questions through a handheld or mobile device), practice quizzes, or practice lab activities.

In each of these cases, students can receive feedback,

and instructors can see where students may be struggling while providing opportunities for practice and learning.

**Authentic assessments and open pedagogy.**

Authentic assessments provide students with opportunities to apply what they learn in a context that is similar to the ways they will use their learning when they are no longer students in the course. A student taking a course in political studies may later need to write a memorandum or speech, but they are unlikely to need to write an essay. An undergraduate student in chemistry is likely going to need to know how to use a laboratory safely, but they are less likely to need to be able to take a multiple-choice quiz.

Taking an open pedagogy approach to assessment allows students to contribute to creating knowledge and resources that demonstrate their learning. Open pedagogy involves students creating or modifying existing Open Educational Resources such as textbooks, but also creating materials like websites, posters, or even print materials that can be used by future students and community members. This approach increases engagement and may help address instructor concerns related to academic integrity.

Open pedagogy also provides opportunities for students to show how their discipline and their learning can contribute to helping local communities and the world address the sustainability challenges we face today.

**Student choice.** Something you may want to consider is giving students some choice when it comes to assessments. Giving students choices can help to increase engagement and decrease stress.

Choice in assessment can take on a variety of formats. Following are just a few possibilities for assessments that can be related to the SDGs:

- The instructor chooses the format (e.g., an essay or presentation), but the students can choose which of the SDGs they'll address for that assessment.
- The instructor gives learners the option of completing the assessment in one of two formats, such as writing a paper or creating a podcast with a partner.
- The instructor provides students with a rubric for an assessment aligned with the outcomes, but the students get to choose the format for their assessment. In this case, one student may write a paper, while another may create an interactive digital artifact that others can use later. The emphasis is on the outcome, not the format of the assessment.

## How to Choose Teaching Strategies

Once you have your learning outcomes and your aligned assessments, you must choose teaching strategies that also align with these. There is a wide range of learning activities that can be used within your teaching, including lectures, fieldwork, discussions, collaborations, and so on.

Whatever strategies you choose, they must

- align with outcomes and assessment,
- fit in the context of the course, and
- be appropriate for the learners in the course.

Your teaching strategies should help students reach the outcomes and show evidence of their learning through the assessments.

Ideally, the teaching strategies will prepare students for not only the assessments but also application beyond the classroom. Just as learners benefit from authentic assessments (see above), authentic teaching strategies help learners transfer and apply what they learn in a course to the workplace, community, and future learning (formal or informal). While it may be tempting to spend all of your class time lecturing, consider integrating other teaching strategies to engage students and help them retain and use what they are learning.

Give students opportunities to practise applying the skills and knowledge they are learning in the course. As discussed in the section on formative assessment above, students should be able to practise in a low-stakes environment where practice activities do not involve grades. Sometimes instructors might need to help learners see the value of completing these activities in the context of their overall learning, and also show how the content and activities can address current issues the students are concerned about, such as climate change. Doing so, and giving consistent and relevant feedback throughout the term, can lead to an increase in student engagement in the course.

## What?

The “What” part of course design is where the “Why” and “How” parts come together to provide both instructors

and students with a clear picture of each class and where the teaching and learning happen.

## What to Include in Your Blueprint

Once you have your learning outcomes, your assessments, and your teaching strategies, you need to pull them all together into a cohesive and coherent plan, or blueprint, that makes sense to you. Much like a blueprint for a house, the course blueprint shows all of the details and how they come together to create the whole.

Creating a blueprint for your course will allow you to see if

- gaps exist in your plan that need to be corrected,
- the order of activities and assessments is appropriate or needs to be adjusted, and
- you're spending an appropriate amount of time on each learning outcome.

The blueprint will also include the learning materials you'll need to prepare for each class meeting and the information you'll need to include in your course syllabus.

Here is an example of a course blueprint.

Course Name: Instructor:			Course Outcomes: 1. 2.									
Time	Notes	Learning Module Title	Purpose and Outcomes	Activate prior knowledge and pre-assessment	Learning materials			Active & Social Learning with Practice & Feedback			Major Assessment of the module	Summary/Wrap around to pre- assessment
					Lecture Captures	Readings	Videos or Links	Quizzes	Discussion	Other		
Week 1												
Week 2												
Week 3												
Week 4												
Week 5												
Week 6												
Week 7												
Week 8												
Week 9												
Week 10												
Week 11												
Week 12												

## What Learning Materials to Choose

It is important to choose appropriate technologies for use in your course. You will also need to choose which textbooks and other learning materials you will use. When doing so, please remember the following:

- Choose materials that align with your learning outcomes.
- Choose materials that are accessible to students. Consider things like cost, the ability for adaptive technologies to work with the material, and so on.
- If you need to order textbooks from the bookstore, do so well in advance.
- Consider choosing an open textbook or other Open Educational Resources that are free and can be adapted to meet local needs, including integrating material on the SDGs.

## What to Include in Your Syllabus

Your course syllabus serves several purposes. While the



university considers it a contract, learners use it as a guide to help them navigate the course. It contains information on assessments and due dates, but it also provides insight into what the learning experience will be like in the course.

Your syllabus will set the tone for the rest of the term. The tone is influenced by what you include in your syllabus, whether you use welcoming or punitive language, and the design decisions you've made for the course.

The Syllabus page on the USask Teaching and Learning website provides valuable information on syllabus requirements from the USask Academic Courses Policy and about the USask Syllabus Generator. The web page includes links to a Syllabus Template as a Microsoft Word document and a PDF version of the Syllabus Creation Guide.

## Reflection and Feedback

Reflection and feedback are vital in course design as they enable continuous improvement and student-centred learning. Through reflection, instructors assess their teaching methods and identify areas for enhancement. By seeking and incorporating student feedback, professors gain insights into individual needs and adapt the course accordingly. This iterative process ensures the course remains relevant and engaging, fostering a positive and impactful learning experience.

USask's Student Learning Experience Questionnaire (SLEQ) is a validated instrument to learn about students' perceptions of their learning experiences. The survey is

somewhat customizable, which enables instructors to use SLEQ as formative feedback about their courses that can inform and assess course design change.

## Suggested Resources

### Assessments

Biem, R. (2022, October 24). Assessing outcomes versus grading assignments. *Educatus*. <https://sites.usask.ca/gmcte/2022/10/24/assessing-outcomes-versus-grading-assignments/>

Biem, R. (2023, January 16). Defining competencies and outcomes. *Educatus*. <https://sites.usask.ca/gmcte/2023/01/16/4478/>

Gwenna Moss Centre for Teaching and Learning. (2023, March 1). USask assessment principles. *Educatus*. <https://sites.usask.ca/gmcte/2023/03/01/usask-assessment-principles/>

University of Saskatchewan Teaching and Learning. (n.d.). *Learning technologies*. Retrieved December 5, 2023, from <https://teaching.usask.ca/strategies/lt-illustrative-examples.php>

### Open Educational Practices

University of Saskatchewan Teaching and Learning. (n.d.). *Open Educational Practices*. Retrieved December 5, 2023, from <https://teaching.usask.ca/curriculum/open-educational-practices.php>

## Sustainability

Garg, A. (2023, April). *Embedding Sustainable Development Goals in teaching and learning*. University of Saskatchewan. <https://openpress.usask.ca/sdgs/>

Institute for Sustainability, Energy, and Environment (iSEE). (n.d.). *Classroom tools: Prepared sustainability resources*. University of Illinois Urbana-Champaign. Retrieved December 5, 2023, from <https://sustainability.illinois.edu/education/teaching/tools/>

OER Commons. (n.d.). *Climate education*. Retrieved December 5, 2023, from <https://oercommons.org/hubs/climate>

## Teaching Strategies

Centre for Higher Education Research, Policy and Practice. (2019). *Active learning strategies for higher education*. Technological University Dublin. [https://arrow.tudublin.ie/cgi/](https://arrow.tudublin.ie/cgi/viewcontent.cgi?article=1000&context=cherrpbook)

[viewcontent.cgi?article=1000&context=cherrpbook](https://arrow.tudublin.ie/cgi/viewcontent.cgi?article=1000&context=cherrpbook)

Taylor Institute for Teaching and Learning. (2020). Teaching and learning activities. In *Course design program* (pp. 46–52). University of Calgary. <https://taylorinstitute.ucalgary.ca/sites/default/files/Content/Resources/Course-Design/22-TAY-Course-Design-Workshop-Manual.pdf>

## Universal Design for Learning

Dzaman, S., Fenlon, D., Maier, J., & Marchione, T. (2022). *Universal design for learning: One small step*. University

of Saskatchewan. <https://openpress.usask.ca/universaldesignforlearning/>

## CHAPTER 4 TEACHING SUSTAINABILITY IN HORTICULTURE

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### Teaching Sustainability in Horticulture

Kate Congreves

#### My Why

Creating a sustainable future is a highly complex problem, one that will require multiple skill sets and competencies. Having access to good education inspires students and builds the skills they will need to effect change for a better, more sustainable future. Providing access and space for students to practise and learn these skill sets is the first step toward equipping the next generation with the capabilities to address the challenges around sustainability.

How can we, as teachers, offer the learning experiences that students require to function in a world that so desperately needs to improve sustainability? I joined the Sustainability Faculty Fellows (SFF) program with the goal of learning what experiences we can offer students and how to do so.

I am a soil scientist and agronomist researching and

teaching about sustainable agriculture and horticulture, so I joined the SFF program to learn about the things I can do in my classroom and in collaboration with my colleagues to help our students realize their goals and become changemakers for a more sustainable future.

## What I Did in My Course

I teach or co-teach several horticulture and agriculture courses. After spending the summer of 2022 in the SFF program, learning from educational specialists at the Gwenna Moss Centre for Teaching and Learning and from other fellows, I moved into the fall term ready (or not) to practise and apply what I had learned in my courses. I used PLSC 220 – Fundamentals of Horticulture to test and apply new ways of teaching students about the United Nations Sustainable Development Goals (SDGs) and of contextualizing sustainability in the foundations of horticulture.

## Learning Outcomes

First, I revised the course syllabus and added learning outcomes that target the sustainability concepts I wanted students to learn. In this introductory course, the most important outcomes for students were to

- identify and differentiate various markets for horticultural crops,
- define vegetable crops and examine their characteristics,
- evaluate the features of sustainable horticulture

- crop production and linkages to the SDGs, and
- plan a sustainable production scenario and reflect on what makes it sustainable or not.

The last two learning outcomes were new.

## Teaching Practices

Having a new syllabus and course assessment structure (see “Assessment Strategies,” below), I focused my attention on reviewing my lecture material, communication, and class activities. I tried to identify places where I could make changes to better apply what I had learned in the SFF program about open and active learning.

To make the course more accessible and open, I selected an open textbook covering horticulture at an introductory level (*Red Seal Landscape Horticulturist Identify Plants and Plant Requirements*, which was published for a similar horticultural course at Kwantlen Polytechnic University in British Columbia), and supplemented this with selected readings from other open sources, including a chapter on soil health published as part of the new open textbook *Digging into Canadian Soils*, by the Canadian Society of Soil Science.

As for active learning, I had to really think about what this means and how I could best support it. I ended up changing my “lecture style” to foster more active learning.

## Learning Activities

**Polls to test knowledge uptake:** Instead of dictating

concepts for the duration of the lecture period, I tried other approaches. I still lectured, but I also used Poll Everywhere (an online platform that lets you host live polls, surveys, quizzes, etc.) to encourage students to think about the concepts before delving into them. Doing so also allowed me to assess their pre-knowledge and gave me an opportunity to dispel myths. Then, as I taught the concepts, I would periodically pause and use the polls to test their uptake of knowledge. I found this strategy fostered a more open and approachable learning environment, where students weren't afraid of being wrong, and instead were actively learning the concepts as I taught them.

**Classroom discussion to define sustainability:** I started a class with the question “How do you define sustainability?” Most students immediately responded with correct but routine answers about environmental integrity, social progress, and economic resources. So, to encourage critical thinking, I challenged them by probing further: “Yes, but what is missing in your definition?” After waiting out the uncomfortable silence, this prompted a thoughtful classroom discussion. Through this dialogue, students learned about the “5Ps” of sustainability (People, Planet, Prosperity, Peace, Partnership) and were introduced to the SDGs.

**Small group activities:** As another strategy aimed at active learning, I created short activities for each class and encouraged small groups to work on and complete the activities together, which was followed by class discussions and sharing. The activities were different each time. Some required students to review

- a table from a publication (like an open report from



the Intergovernmental Panel on Climate Change, or IPCC),

- a website or a resource (like the Canadian Food Inspection Agency website, or a vegetable plant classification table), or
- a short reading (like a scientific short communication or perspective article).

I would give them a guided question to work on as they carried out the activity, and they would work together to come up with answers.

As one example, I asked students to review the SDGs as listed on the United Nations website, identify which ones are related to horticulture, and collectively decide on one that most resonated with them. Each group elected a spokesperson who would explain their selected SDG to the rest of the class and share their reasons for selecting it.

Although these activities were short (ranging from 5 to 10 minutes in length), they helped students actively work with the material, make connections, and practise drawing interpretations and communicating them. They also reduced the risk of students tuning out during the rest of my lecture.

**Ocean of Optimism:** Another activity that I found useful in prompting a classroom discussion on horticultural sustainability was the “Ocean of Optimism.” This activity is done in three stages: first ask students to deliberate a utopia-like scenario, then conduct a critical analysis of the current barriers, and finally have a discussion on the changes needed to move from the present state to a desirable scenario.

I framed the prompts as follows:

1. **Ocean of Optimism:** Ideally, what would sustainable food production be like?
2. **Lake of Despair:** What are the current barriers to developing sustainable food production?
3. **River of Change:** What factors/initiatives/goals would bring about the required changes?

**Exploring aspects of public reports:** I believe it is important for students to consider and understand different perspectives, so I used a few activities to draw this out of them. For example, I used snippets of IPCC reports (key tables or figures) to get students to see how a group of diverse experts come to their determinations about climate change and impacts. In the reports, conclusions are supported with qualifiers like high, medium, and low relating to expert confidence or consensus, and the direction or magnitude of the impact is often reported using scales. The intention was for students to begin to understand that different perspectives are key for the development of robust systems thinking and problem-solving skills, and that together, students can draw more informed understandings of our world.

**Experiential and place-based learning:** In the SFF program, we spent time reflecting on experiential learning and thinking about the significance of place-based learning. I believe my course, PLSC 220, was already doing a great job supporting experiential and place-based learning, largely because of the work of other course designers before me, as well as other instructors.

Each week, during our three-hour lab period, students board a bus and are brought to a local commercial

horticultural operation (a farm, nursery, greenhouse, market, food bank, warehouse, processor, or innovator). The students hear from the owners and operators and experience the space and activities taking place in these operations. For the fall of 2022, we added new stops, including a trip to Wanuskewin (Indigenous cultural complex and National Historic Site near Saskatoon), where students could learn about native plants and horticultural practices and hear directly from experts on staff. The goal was for students to learn about these plants in an intentional and relevant way.

To help students get the most from the field trip experiences, we gave them their reflective essay assignment beforehand, and we guided them on how to reflect. We used three questions to get them thinking:

1. What did you learn on the field trip? (Provide at least one specific example per location.)
2. Why is it important to you?
3. How will you use what you've learned? (Consider your job, future classes, higher education, and life in general.)

**Guest lecture from upper-year students:** I also exposed students to a real-world initiative closer to home when I invited two upper-year students to come and tell us about a student-led sustainability initiative. These were previous students of mine and are members of the Student Horticulture Club, for which I am the faculty advisor. I had worked with these students over the summer of 2022 to revive the rooftop garden at the College of Agriculture and Bioresources (AgBio). I met with them frequently to plan their garden, helped them

get resources to implement their plan and grow their crops, and helped them set up a mini-market in the AgBio Atrium to sell their produce to other students and staff (by donation, pay-what-you-can), and subsequently to sell their produce to Marquis cafeteria.

Knowing that these students were leaders, I invited them to share their project with my PLSC 220 class. I helped them prepare their presentation, and I watched with delight as they taught their peers about vegetable crops and their characteristics and markets; how growing a garden on the AgBio rooftop helps improve campus sustainability; and how the garden links to key SDGs. I was amazed and so proud of these students, and my PLSC 220 students were inspired by them, too.

## Assessment Strategies

Many of the activities described above also served as formative assessments (whether the students realized this or not) and were meant to give them practice (thinking, discussing, interpreting) before the summative assessment at the end of the section of the course I taught.

After reviewing the original course syllabus and student feedback from previous years and thinking more deeply about the models of authentic assessment that I learned about as part of the SFF program, my co-instructors and I substantially changed the assessment structure for PLSC 220. In prior years, we tested students with two large exams (a midterm and the final) and one small project. The exams were multiple choice and included questions on all topics covered, including our

weekly field trips. But this year, we broke things down into smaller chunks:

- Three multiple-choice quizzes focused on lecture content
- A reflective essay to assess engagement and learning from the field trips
- A small project for landscape design of a volunteer's yard

For my section, I wanted students to demonstrate that they could apply the concepts taught, so I replaced the multiple-choice quizzes with a written proposal (note: this was before ChatGPT was a thing; see “Lessons Learned,” below). Students were asked to describe their ideas for a new on-campus sustainability initiative, incorporating the scientific concepts that I had taught (vegetable production techniques, horticultural markets, and soil health management), and identify/explain linkages to the SDGs.

## My Reflections

At the end of my section, one student came up to me and told me they had never taken a class quite like this one before, where, instead of being “lectured at the whole time,” students were challenged by my open-ended questions in class, something this student appreciated. I took this as a sign that they actually had to think, which was my goal. Granted, PLSC 220 is an introductory-level course, so I am sure the student will

experience more courses like this as they progress in their degree.

## Lessons Learned

Sometimes, I found it challenging to draw the students out to share their thoughts. After emerging from COVID-19, these students did not have a lot of experience with in-person, in-university courses, never mind voicing their thoughts to the entire class. So, I had to back up a bit. I found that technology like Poll Everywhere helped students “voice their thoughts” anonymously and frequently. Once they got used to interacting with me and their classmates via this platform, they started to open up and speak up more in class. Creating an open and approachable environment was key to fostering more active learning.

Some assignments need to be reconsidered and reformulated now that we are in the world of AI writing. I think we need to focus more on the journey of learning (i.e., fostering deep thinking) rather than the deliverable (i.e., producing an essay). How can we better support students to apply new concepts, think critically and reflect on their ideas, and communicate their thoughts well? Although AI may help with the communication part of the puzzle, it doesn't help with the thinking part. That brings us back to authentic assessment, meaningful learning outcomes, and the linkages between the two.

I had hoped to provide opportunities for students to build the competencies and skill sets necessary for sustainable horticulture, beyond theory and contexts to

also include communicating meaningfully, engaging in our intercultural society, nurturing successful relationships, leveraging technology, employing adaptive design and problem-solving, and cultivating resilience. With revised learning outcomes, teaching practices, learning activities, and assessment strategies, I think we moved the needle in the right direction. We provided opportunities for developing these competencies, but mastering the competencies will require more sustained and systemic curriculum and program design.

## CHAPTER 5 TEACHING SUSTAINABILITY IN ENGINEERING

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### Teaching Sustainability in Engineering

Tate Cao

#### My Why

For me, sustainability is the core value to fulfill an engineer's obligation to "hold paramount the safety, health and welfare of the public and the protection of the environment." This is the first item in Engineers Canada's Code of Ethics.

Engineering disciplines have improved the quality of human life over the last two centuries through innovation and industrialization. Engineering has also created unintended consequences for our environment and society. As an innovator and an educator who shapes and prepares future leaders, I believe it is my responsibility to ensure we think about and plan for these potential consequences as we develop new technologies.

Growing up in fast-developing China in the 1980s and '90s, I experienced a rate of industrialization in 20 years



that took two centuries in Western countries. The benefits of industrialization are obvious: things like increased life expectancy, more convenient transportation, refrigeration, and better roads. Overall, it created a better standard of living.

At the same time, the speed at which industrialization has driven development also changed the natural environment and how we experience nature. I remember a small forest just outside of my grandparents' village where we would go for walks and gather wild mushrooms after a fresh rain. As the city grew, the forest was cut down and the trees were used as building materials. Even though new trees were planted on the same spot, the mushrooms were gone and have yet to come back.

Loss of biodiversity is not the only problem. In 2012, when I lived in Beijing, the smog caused a lot of pain in my eyes and lungs. Fast forward to 2023, and we had a record number of forest fires in Canada, so that smoke covered most of the country and much of the United States. It almost does not matter whether the fires were a result of natural causes, human activity, or climate change caused by humans. The question is how can we use our talents to ensure the environment we live in is protected while we improve our quality of life?

Sustainability is not a problem for just one country; it is a global issue. Engineers are often called upon to be responsible for environmental management regardless of their particular discipline or role in their organizations. Quickly changing environmental and societal issues require new skill sets for the engineering profession, which are provided through education and continuing professional development. The Sustainability Faculty

Fellows (SFF) program and sustainability in teaching and learning interested me as a critical pathway to incorporate the call from Engineers Canada to bring sustainable development and environmental stewardship into classrooms.

## What I Did in My Courses

I teach five undergraduate courses and one graduate course in the College of Engineering at the University of Saskatchewan. I worked on incorporating the principles of the United Nations Sustainable Development Goals (SDGs) in the Technological Innovation Design Capstone course and Technology Innovation Management course.

Though the call for sustainable development in engineering has recently become more urgent, the engineering profession has been encouraged to focus on the triple bottom line (also known as the 3 Ps: people, profit, planet) for decades, so environmental stewardship and social responsibility are not new topics. This provided a great foundation for me. I mostly updated my teaching and learning practices to support the students not only to understand the concepts but to experience them emotionally—to create changes in their minds and hearts. Following are examples from both of the courses to show how I incorporated sustainability and changed my teaching practices accordingly.

## Learning Outcomes

In my Technological Innovation Design Capstone course, I face a unique challenge as it is a multidisciplinary

entrepreneurial design capstone as opposed to a discipline-specific design project. The projects in the course range from biomedical to agricultural or even aerospace projects. As a result, these projects may connect with different SDGs.

I tried to generalize so that the students would be able to understand how their specific engineering design work might impact the public good both positively and negatively. As such, I added the following learning outcome: evaluate social and environmental benefits and risks of the design solution according to the 17 SDGs and mitigate any potential risks throughout the project.

To maintain their accreditation, Canadian engineering colleges must demonstrate that their graduates have 12 identified attributes. I determined that sustainability and the SDGs align with the following nine of those attributes:

- A knowledge base for engineering
- Problem analysis
- Investigation
- Design
- Individual and teamwork
- Communication skills
- Impact of engineering on society and the environment
- Ethics and equity
- Lifelong learning

My goal is to encourage the students, as technology builders, to think critically about their own creations, and to both appreciate the potential benefits for society and consider potential negative impacts for the environment

or society. I created a similar learning outcome in my Technology Innovation Management course; however, students in this course are more likely to assess the technology from a managerial perspective rather than a technical one.

## Teaching Practices

In terms of specific teaching practices, I used a combination of experiential learning, guest lectures, and Open Educational Practices in my courses to increase the impact of the learning.

**Experiential learning:** In the Technological Innovation Design Capstone course, I created more opportunities for experiential learning. The students were asked to identify more than one potential user and buyer to establish regular communications as they progress through the design project. Prior to their contact with the users, students were given training on empathy using the Interpersonal Reactivity Index (a measurement tool for assessing empathy) and on how to conduct user interviews using qualitative research methods based on the book *Talking to Humans*. Throughout the course, the students had to visit potential end users in their spaces and, via various activities, to verify

- the problem they are solving,
- the value provided by their design (value proposition),
- their potential solution, and
- the potential impact of their solution on broader stakeholders.

This process is documented in the proceedings of the 2023 conference of the Canadian Engineering Education Association (soon to be published).

**Guest lectures:** Guest lectures are a great way to connect theoretical concepts with real-world situations and interdisciplinary perspectives. One of the challenges of having a guest lecturer is that you must relinquish some degree of control in your classroom. In general, my experiences with guest lecturers have been very positive, but I do set some simple parameters.

When I want to bring in a guest lecturer, I begin by defining the key topics and summarizing the key learning outcomes and points to be covered. I then explore my network to see if I can identify a potential guest speaker. If I can't find a relevant speaker within my network, I practise what I teach in my entrepreneurship class—using cold calls and emails.

After a speaker agrees to come, I meet with them ahead of time to explain the key learning outcomes for their session and ask them to speak to these using examples from their recent experiences. I also share the key pre-class reading for students with the speakers so that we have a common understanding of what is being discussed.

On the day of the session, I open with a short discussion on the reading and introduce the speaker. After the presentation, we discuss how the key topics related to the speaker's presentation.

One of my guest lecturers was the vice president of an international mining company. I had simply requested that they speak to the innovation gap in the industry and the opportunities for university students to be involved. The speaker gave a lot of good examples of the need for

sustainable technology in the mining industry, driven by regulatory, safety, and economic considerations. These needs included ways to reduce water use and CO<sub>2</sub> emissions in key operations, remove humans from dangerous underground operations, and even make potential operational changes that could protect the environment while increasing productivity.

The students reflected that they had never known a mining company to be so forward-looking and sustainability focused!

**Open Educational Practices:** My first contact with Open Educational Practices was in my first year as a faculty member at the University of Saskatchewan. When I was designing new courses and no suitable textbooks were identified, I relied on open textbooks and publications to support my teaching.

The SFF program exposed me to the idea of encouraging students to create Open Educational Resources. In my Technology Innovation Management course, I asked the students to create a case study based on a potential real-life investment that could increase production capacity in the region. The students were to conduct literature reviews and interviews with various stakeholders to understand the needs across the value chain. The considerations were summarized in a short case study to demonstrate the multiple considerations involved when investing in a new green technology, and how that technology may also create both positive and negative impacts for society. The case study will be used in my upcoming Engineering Economics class.

## Learning Activities

My classes teach technological innovation and entrepreneurship. In these classes, I focus on teaching students to create new technology and then find a way to commercialize that technology. In my classes, students often need to balance economic growth and potential environmental and social impacts. Even though this is a principle most of my students understand and it is a standing principle for the engineering profession, the uncertainties related to these innovations can often be intimidating for the students. My goal is to create a safe space that is free of judgment and where students can develop skills through experiential learning, practice, and potential failure.

Engineering students need to be able to assess the impact of their work on society, as this is one of our graduate competencies. A common tool provided to the students in the engineering design process is the triple bottom line assessment.

To maximize the impact of this exercise, I attempted a new approach to encourage the students to work together and to leverage different perspectives in class. In my Technological Innovation Design Capstone class, I prepare the students to recognize different perspectives through two surveys: a simplified True Colours test and Interpersonal Reactivity Index. The True Colours test uses colours (orange, gold, green, and blue) to differentiate the four primary personality types. The Interpersonal Reactivity Index is a 28-item survey that defines empathy as a multifaceted phenomenon based on four

subscales: fantasy, perspective taking, empathic concern, and personal distress.

The results of these surveys provide an opportunity to discuss diverse perspectives. During the discussion, I emphasize how different perspectives are important and that teams need to encourage all students to contribute. This empowers female and visible minority students to share their insights. It also allows the student groups to better understand often overlooked or dismissed sustainability issues that impact female, visible minority, and other marginalized groups.

Furthermore, I foster peer learning through feedback and discussions both in and out of the classroom. In class, peer reviews are set up at the beginning of class via team stand-ups (see description in the next section).

Outside of class, I use an online social annotation tool called Perusall to encourage discussion among students about the case studies for each week. I typically assign one or two articles each week relating to the upcoming lecture. Through Perusall, students can ask questions, provide insights, and upvote others' responses as they read through assigned course materials.

Students are graded on their activities and level of interactions with others. This approach has been very effective in creating a social learning environment, and students often come to class each week having had lots of discussions amongst themselves. I then touch on selected topics in class to continue the conversation in the classroom.

## Assessment Strategies

**Formative assessment:** I use a simple strategy, one that



is common in start-up communities, to provide formative feedback to students: the team stand-ups. At the beginning of every class, each team appoints a representative who has two minutes to update the entire class about their challenges and progress. Then the class and instructor provide constructive feedback and suggest solutions to their challenges.

**Summative assessment:** I employ competence-based strategies in my summative assessments. The class projects are broken down into three or four submissions. Each submission builds on the previous one. Feedback and grades are given to students for each submission. However, students can update their submissions to address comments. The final grade is based both on the quality of the final report and on the improvements the students have made.

## The Implications

My journey as a sustainability fellow has created opportunities for me to bring a sense of social responsibility to my classroom. To be honest, I was not sure how my students would react to topics around sustainability that might be unfamiliar or controversial to people with different backgrounds. To my surprise, the students welcomed these discussions. Many students expressed appreciation for learning about ways they can contribute to improving human lives in industries in ways they had not predicted. Some students recently came back to me expressing how much they liked the examples and case studies I gave that described social

entrepreneurship and public funding support in land restoration in other parts of the world.

These comments opened my eyes to how much students care about the broader issues and are longing for opportunities to make connections between what they are learning in their professional lives and what they care deeply for in their personal lives.

## My Reflections

Reflecting on my experience, the SFF program has been a great opportunity to incorporate sustainability into my classroom. It has been humbling to see how much students and industry care about sustainability topics. As an educator, my role is to expose students to topics that are meaningful to them and prepare them for the roles they will take on after graduation.

Sustainable development in engineering remains a challenging topic for the profession, so an interdisciplinary perspective and approach are needed to develop tools and resources to teach and practise these concepts in engineering education. Through the SFF program, I was exposed to multidisciplinary perspectives.

In my practice, I was fortunate to receive encouragement and various supports from my colleagues within the Ron & Jane Graham School of Professional Development. They generously provided insights, historical case studies, and tools and perspectives from the humanities to expand my understanding. Joel Frey helped me better understand how personality impacts the decision-making process

in engineering design. Cory Owen inspired me with descriptions of how technologies are portrayed in science fictions in different time periods. Lori Bradford, the Canada Research Chair in Social and Cultural Decision Making in Engineering Design, generously supported me through the experience and provided insights that often pushed my understanding of the meaning of sustainability and how it relates to many social aspects. She generously shared her expertise and many resources from her social science background. These interdisciplinary perspectives significantly contributed to and shaped the teaching and learning experience in my classroom.

It has been interesting that the SFF educational practice also improved my own understanding of sustainability and how it connects to my personal and professional lives. This expanded understanding has informed my own research and practice in how digital technologies can contribute to sustainable agriculture.

## Lessons Learned

The biggest challenge to implementing sustainability pedagogies is the time required to plan and implement them in courses. I recognized that I may have attempted to do too much at one time. It does not have to be done this way. I think focusing on one course and even one lecture at a time is a perfect way to get things started in your courses. At the same time, leveraging research activities to inform educational activities can be a great way to reduce workload and inform students about cutting-edge developments.

## CHAPTER 6 TEACHING SUSTAINABILITY IN KINESIOLOGY

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### Teaching Sustainability in Kinesiology

Shannon Forrester

#### My Why

I was born and raised on the beautiful land in Treaty 6 Territory and the Homeland of the Métis. The land nurtured and shaped me to become the person I am today, igniting my love of physical activity and, in turn, my passion for kinesiology. I have a deeply rooted respect for the land and its profound effect on me. I recognize the reciprocal relationship with this land that existed for people long before me and my settler ancestors. I cherish the thought that it will continue to nurture my children and future generations, and I am invested in its protection.



Image courtesy of A. Wiebe

I didn't always embrace sustainability. My strong connection to nature and being "green" initially led me to view sustainability through a purely environmental lens. As such, when I first learned about the Sustainability Faculty Fellows (SFF) program at the University of Saskatchewan (USask), I dismissed thoughts of involvement. Although I do what I can to support a healthy environment, I did not see a strong fit professionally. Sure, I could support surface-level environmental strategies like promoting the use of stairs, active transport, or online distribution and submission of classroom materials; however, I did not consider this directly relevant to my area of teaching.

Looking a little deeper, I discovered that the SFF program used the United Nations Sustainable Development Goals (SDGs; see Chapter 3) as a

framework to understand sustainability not just through an environmental lens but through a social and economic one. When I considered sustainability within all three dimensions, I quickly realized sustainability in teaching and learning was a great fit for me and the College of Kinesiology.

Conceptualizing sustainability through the SDGs, I could envision both personal and professional connections, tying my love of nature (SDG 15: Life on Land and SDG 13: Climate Action) with my love of physical activity and movement (SDG 3: Good Health and Well-being). I also strongly believe in social justice, so I was particularly interested in the strong intersection with equity, diversity, and inclusion, as well as Indigenization. I felt that sustainability in teaching and learning would support not only my personal ambitions, but also the strategic goals of my college.

Another draw to sustainability in teaching and learning was pedagogical. Foundational concepts of sustainable teaching include reflection, relationships, and effective communication, which align strongly with my teaching philosophy. More specifically, these were teaching strategies that would enhance student learning and focus on the development of competencies for sustainability (see Chapter 2)—which I believed in, which I already tried to foster, and which would extend beyond the classroom to develop positive global citizens.

I saw that the SFF program could help me make my contribution to the type of world in which I wanted to live, work, and play. My ability to make a difference is twofold:

- By using powerful Open Educational Practices, I can

create opportunities for my students to reflect, share, and act in ways that support the SDGs and help them develop key competencies.

- I can increase awareness and advocacy by supporting colleagues and other educators in using sustainability in teaching and learning.

## What I Did in My Course

My first step was to review the USask sustainability strategy, *Critical Path to Sustainability*, which commits to capitalizing on strengths. The mission statement for the College of Kinesiology is “We lead and inspire movement, health, and performance,” which aligns with SDG Goal 3 (Good Health and Well-being) and would be a significant strength.

The Canadian Indicator Framework for the Sustainable Development Goals addresses the 17 SDGs and adds key Canadian targets:

- Adoption of healthy behaviours for all Canadians
- Ensuring Canadians experience healthy and satisfying lives
- Prevention of premature death in Canada

Extending these ambitions for *all* Canadians aligns with our teaching and research in the College of Kinesiology—Indigenous wellness, healthy aging and management of chronic conditions, child and youth health and development, and human performance (College of Kinesiology, 2018).

Given this alignment, I would argue that all College

of Kinesiology courses support sustainability, even if our current complement of courses does not explicitly make this connection for students. The course in which I chose to embed sustainability, intentionally and explicitly, was KIN 424 – Physical Activity and Aging. This is a fourth-year course focused on topics related to physical activity among older adults.

My intention was not to completely overhaul the course,<sup>1</sup> but rather to maintain the primary focus while incorporating sustainability. To accomplish this, I started with a blueprint tool to determine where my current practice and strategies already aligned with the SDGs and sustainable student competencies. Throughout, I was guided by three principles for sustainability in teaching and learning at USask:

- Course outcomes that focus on development of sustainability competencies
- Instructional strategies that provide agency to students to reflect, share, act
- Assessment that directly measures student skill level in competencies

Merging these with principles of constructive alignment (Biggs, 1996), I started to revamp the course.

## Learning Outcomes

My next step was to identify the learning outcomes I wanted students to achieve and then update learning activities and assessments to align with the revised outcomes. From a discipline perspective, I knew I wanted students' respectful perspective taking to reflect on the



ways kinesiology could support the SDGs. More specifically, I wanted students to identify the personal and professional role they would play in enhancing their own health and wellness as well as that of their communities and the planet; however, the learning outcomes for the course would have to be specific and aligned to the curriculum.

I had to draw explicit connections between the existing course outcomes and sustainability. Although my course content could speak to a variety of SDGs, and my intention was to draw on all of them, I wanted the sustainability-themed outcomes to be more targeted.

The two SDGs I identified as having the strongest affiliation with the course content were SDG 3 (Good Health and Well-being) and SDG 10 (Reduced Inequalities). Using *Embedding Sustainability Development Goals in Teaching and Learning* as a guide, I was able to embed these SDGs in my learning outcomes.

**KIN 424 – Physical Activity and Again Course Outcomes****Course Learning Outcomes:**

1. Reflect on inequalities and discrimination faced by older adults in Canada and identify causes and strategies to reduce them.
2. Evaluate how physiological and psychological aspects of aging may relate to good health and well-being.
3. Appraise the social and cultural aspects (e.g., gender, sexual orientation, ethnicity, income) of older adults that may affect participation in physical activity as a strategy to promote good health and well being.
4. Examine the role of physical activity in supporting the Sustainable Development Goals, specifically as it pertains to the older adult population.
5. Design programming (based on assessed needs) to promote the adoption of physical activity to support good health and well-being.

## Teaching Practices

With a working set of revised learning outcomes, I next turned my attention to my teaching practices. Would they facilitate achievement of both my learning outcomes and the new sustainable competencies? In other words, was I providing for student choice and voice? Was I working toward changing mind, heart, and skill sets? Designing reflective practice? Leveraging interdisciplinary efforts? Was I making community connections? (See principles for sustainability in teaching and learning at USask.)

Once I felt I had adequately planned for the use of these strategies to support the competencies, I moved on to leveraging Open Educational Practices. Although open education appears to have fluid definitions (Cronin,

2017; Zawacki-Richter et al., 2020), the aspects of “open” that spoke to me for supporting sustainability included

- accessibility through creation and use of Open Educational Resources,
- student agency,
- authentic assessment, and
- community engagement.

Although I was able to address development of all student competencies, I was selective in my emphasis. Throughout the course, I wanted students to become proficient in sustainability through UNESCO’s Reflect, Share, Act model. To “act,” the students would work in their community to promote SDG Goal 3. Consequently, I focused on the sustainability competencies that were most relevant.

## Learning Activities

Building a foundation for sustainability began on the first day of class with a welcome, a land acknowledgment, and perusal of the syllabus. The land acknowledgment was the perfect opportunity to introduce the concept of sustainability and position sustainability within USask as outlined in the *University Plan 2025*. It also provided an opportunity to invite students to begin reflecting on their own sense of place and position in the world. Reviewing the syllabus allowed students to identify how sustainability would be situated within the course.

The second class accomplished many objectives. I began changing mind, heart, and skill sets by asking

students to envision a world they wanted to live in. Using an adaptation of what the Sustainability Faculty Fellows have coined the “Ocean of Optimism” activity (see Figure 1), each student was able to create a personal connection with sustainability. This was a terrific way for students to envision sustainability from a broad perspective and a great segue into the SDGs. I also used this lecture to begin the reflect and share portions of “reflect, share, act” and, concurrently, to begin to practise meaningful communication with discursive teaching strategies (Van Hesteren, 2018).

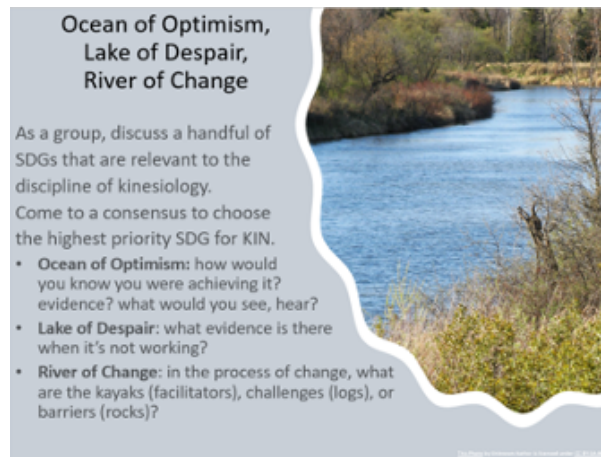


Figure 1: Kinesiology supporting sustainability (slide from my KIN 424 lectures)

In subsequent lectures, I delivered the course curriculum as I typically would; however, I invited students to draw connections to the SDGs where appropriate. At the end of select lectures, I provided students with guiding questions to facilitate reflection; throughout the course,

they were encouraged to use sustainability journals to reflect on content they felt resonated with the SDGs.

I used laddering to build on concepts and support assessment. For example, students were able to use theory from psychosocial health lectures to ensure support of self-esteem in communicating with their peers and, later, with community members. We used other discursive strategies (Van Hesteren, 2018) as well as a group charter activity (Weimer, 2015) to further work on meaningful communication and nurturing relationships.

To support interdisciplinary perspectives, I brought in guest lecturers from other departments. Sharing knowledge or varying perspectives from relevant disciplines gives students a broader view of an area of study.

When we reached the final class, I provided space for students to tie everything together through summarizing, reflecting, and sharing thoughts on the interconnections between sustainability, the course content, and the discipline of kinesiology.

## Assessment Strategies

**Formative assessment:** Throughout the course I included opportunities for students to reflect and practise through low-stakes formative assessment with feedback, including multiple opportunities to practise communication skills and relationship-building, as well as a variety of polling questions and case studies. These case studies allowed students to practise applying theory that would later be assessed in a summative manner.

**Summative assessment:** In addition to more

traditional midterm and final exams, I had four summative assessment opportunities (students were required to complete three of four). I tried to assess a variety of learning outcomes as well as the development of student competencies while still allowing student agency where possible.

Open Educational Practices (authentic assessment, community impact, and creation of Open Educational Resources) were evident in the final course assessment. Students collaborated with a community member and created one resource for that community member and another for broader community use. An overview of each assessment, including the purpose and alignment to both the learning outcomes and student competencies, was included in the course syllabus.

## The Implications

Sustainability in teaching and learning allows students to learn more about who they are and what they can do, and to develop competencies that extend beyond the classroom. This includes creating an impact in the community and, ultimately, acting toward sustainability.

The sustainability competencies they develop are skills that future employers expect from higher-education graduates. Students who can demonstrate these skills will have a marked advantage. Students have opportunities to learn, practise, and develop these skills through sustainability in teaching and learning.

In my course, using authentic assessment, students applied theoretical knowledge and collaborated with community members to develop a physical activity

resource. This provided a real-world example of skills transferable to the workplace while also positively contributing to the older adult community in Saskatoon. These skills will benefit students in their professional careers and contribute to their awareness as global citizens. Students gained an understanding of their personal and professional role in creating a more sustainable future, which is a foundation for making meaningful change.

## My Reflections

Throughout my journey in the SFF program, I conscientiously reflected on the experience. Sometimes reflecting more, sometimes less; most times positively, but sometimes less so.

The fellowship began at a particularly interesting and apt time. In the spring of 2022, the war in Ukraine was well underway and the world was starting to emerge from the lingering restrictions of the COVID-19 pandemic, which was unduly harsh on certain demographics, escalated an existing mental health crisis, and was particularly divisive. Amid all of this, the fellowship was a beacon of hope. The SDGs outlined what I wanted my world to look like and spoke to my professional pursuits from pedagogical and disciplinary perspectives.

Personally and professionally, I strongly identified with good health and well-being (SDG 3), but I felt tension as I tried to reconcile my own health and wellness. I was feeling fatigued (perhaps the aftermath of COVID-19 or other events happening in my life at that time), and I

struggled with the decision to take on the fellowship. It was somewhat ironic—as I questioned societies’ constant drive for more (the force underpinning the need for sustainability), was I doing the same? It was a project for the better good, but was it sustainable for me?

Personal sustainability was a theme throughout my fellowship experience and created tension between feelings of “survive” and “thrive,” a concept I later learned from the book *Change: How Organizations Achieve Hard-to-Imagine Results in Uncertain and Volatile Times* (Kotter, Akhtar, & Gupta, 2021). The driving factor for me was “heart”: sustainability was something I believed in and an area I wanted to have influence within. I used to think there was little I could do as a single being to create significant impact, but through my platform as an educator, I felt inspired to be an advocate for change. This energy pushed me away from “survive” and toward “thrive.”

To maintain this focus, I had to learn to manage expectations—especially when I felt I was not doing enough. Tracking change—continually looking back to where I started and celebrating small wins along the way—helped to sustain confidence and momentum. Equally important was the ability to pivot: recognizing what was working, building on that, and walking away from what was not. As course development is an iterative process, the results from a pre- and post-course student survey (mentioned in Chapter 1) were particularly helpful for future considerations.

Finally, and perhaps most importantly, I did not feel as if I were charting a solo path through this process. Early in our fellowship we read *Braiding Sweetgrass* by Robin



Wall Kimmerer (2015), and the themes of reciprocity and culture of community really spoke to me. I saw these concepts in action in the fellowship as we shared thoughts and ideas, embraced different perspectives, discussed challenges, and celebrated each other's success. I look forward to embedding sustainability in teaching and learning into more of my courses and to supporting colleagues to do the same.

## Lessons Learned

Sustainability is about more than the environment. Although the environment is an imperative component, so are the social and economic pillars. Without all three, we cannot attain sustainability.

It became evident to me, working first with students and more recently with colleagues, that education on the breadth of sustainability is needed. Lack of knowledge presented the biggest barrier. If you do not understand sustainability in its entirety, it can be difficult to recognize the role you can play. Using the SDGs provided an incredible framework within which everyone could be a part of the conversation and, hopefully, the solution. There is an SDG that speaks to everyone and that works for every course. To realize global sustainability, it will take people from diverse backgrounds and areas of expertise.

Becoming comfortable with all aspects of sustainability takes time and practice. Throughout the course I questioned how much guidance I should provide in the classroom; I was unsure whether I should draw more connections between course content and the

SDGs or leave it up to the students. I am still unsure and, for now, will continue to do both. Moving forward, I intend to embed sustainability in teaching and learning within required courses earlier in the program.

Working in the community takes more time and practice, for me and for the students. Shifting from a final assignment framed around a series of case studies to a collaborative project with a community member increased administrative stressors (scheduling, communication, liability). As well, it took more time and effort to move the redevelopment and assessment of student competencies from theory into practice for the first time. However, the increased effort was not undue, and it will diminish with experience.

I had always discussed with students the importance of nurturing relationships, navigating different perspectives, and communicating meaningfully, but having them work with a real, live person made that paramount. Even though we addressed effective communication practices from day one, students needed more time and support than I had anticipated. I had to adjust the lecture schedule to give students time for the practice and feedback required to succeed. Although working in the community was more stressful, the result had a positive impact on me, the students, and the community.

The biggest takeaway has been the power of heart set. As I continued to promote and raise awareness of sustainable teaching, I saw this positive heart set spread from me to my students and, ultimately, to my colleagues. A shift from “having to” toward “wanting to,” which stems from gaining a personal connection,

provides a motivational boost for change (Kotter et al., 2021).

Even if the right heart set is there and change is something you have chosen, it can still feel overwhelming at first. Start with your strengths (personal, professional, course-related) and build from there, thereby mitigating stress and increasing authenticity. If you take on too much, take a step back, adjust your expectations, and remember that everything you do (no matter how small) is still one more step toward sustainability.

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## Notes

1. This course was revamped and not designed from a blank slate, so I want to acknowledge efforts and contributions from previous instructors: D. Drinkwater, W. Duff, H. Foulds, and J. Gordan.

# CHAPTER 7 TEACHING SUSTAINABILITY IN BUSINESS

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## Teaching Sustainability in Business

Brooke Klassen

### My Why

From my very first experience teaching business, I have tried to incorporate current, real-world issues into my teaching by making connections between those issues and business theory. I saw the Sustainability Faculty Fellows (SFF) program as a call to formalize my long-standing interest in embedding sustainability into my teaching. I want to keep pace with change and stay relevant—I can see sustainability becoming increasingly important in our college and university. Sustainability issues are literally everywhere, and universities can play a leadership role in addressing these issues. I want to be part of that positive wave of change at both a college and an institutional level.

### What I Did in My Courses

I have taught five undergraduate and two graduate

business courses in the past year as a tenure-track faculty member. I teach across two disciplines—management and marketing. Topics have included introductory and advanced marketing, venture development (business planning), and business and society.

Having learned about the Sustainable Development Goals (SDGs) and how to embed sustainability into my courses over the previous summer, I found it relatively easy to make connections between the SDGs and the content I was already covering. For anyone interested in a shortcut to this process, there is a free online tool called [LinkedSDG](#) that will analyze uploaded Word documents and make connections with SDGs, targets, and indicators.

Embedding sustainability into teaching is not that hard (and might even be fun?!) once you understand the many ways we can seek to be more sustainable. As is the case for many people, my understanding of sustainability started with the environment. Once I became acquainted with the SDGs, I understood more clearly how broad the concept actually is.

## Learning Outcomes

I embedded sustainability learning outcomes across several of my business examples. One example from my introductory marketing course was to add the following learning outcome: “to engage in constructive classroom conversations about sustainability and reflect on your role as a responsible citizen in business and in life.” In future, I plan to include an outcome related to student actions on sustainability, but I wanted to start at a

manageable pace by enhancing content and helping students develop their ability to share ideas around sustainability with others. In my graduate course on business and society, I included two sustainability-related learning outcomes:

1. Describe the multiple responsibilities of business using stakeholder theory (stakeholder relations: consumers, community, and environment).
2. Demonstrate the ability to integrate social responsibility and sustainability into managerial decision-making.

It worked well to focus on sustainability in courses that I had previously taught multiple times, because I had an intimate knowledge of the course content. If I had attempted to embed sustainability learning outcomes in a course that I had not previously taught, I'm quite certain I would have felt overwhelmed.

## Teaching Practices

I use several teaching practices to help students develop sustainability competencies.

**Case studies:** We commonly use case studies and group work in business classes. I created several mini case studies based on recent articles in the media around sustainability-related marketing issues—including both companies seen as contributing to sustainability in a positive way and companies who missed the mark in terms of inauthentic or tone-deaf attempts at addressing sustainability issues. One case study involved a decision made by a consumer goods

company to market a set of pink and purple pens only to women and the backlash that followed when they stood by their decision and refused to acknowledge their mistake. Students easily made connections to SDG 5 (Gender Equality).

**Reflective practices:** I incorporated some guided reflective discussions using the *What? So What? Now What?* model of reflection (Rolfe et al., 2001). In the past, I have included a written learning journal assignment in my online marketing classes, but the assignment has never achieved the outcomes I hoped for. Through the SFF program, I was exposed to several models of reflection and I realized I may not have been asking the right questions or giving students enough guidance about how to approach a reflection. Having an excellent set of questions to guide reflections on what they learned from a group project made the experience more meaningful for students. It also helped to make time for classroom conversations, as it created a sense of accountability—students needed to be able to communicate their thoughts with other students in class and not just with their professor in a written document.

**Open Educational Practices:** I have utilized Open Educational Practices (OEP) for many years. My first experience with OEP happened when I developed a textbook for a first-year academic skills seminar. We couldn't find a suitable Canadian textbook, so with encouragement and funding from our university's teaching and learning centre, my co-teacher and I adapted an openly licensed American academic success textbook.

When I use an Open Educational Resource in one of



my classes (which I try to do as often as possible), I talk about the value I place on OEP as compared to the traditional student-pay model. In hallway conversations with students, I have been told how much they appreciate my efforts to keep the cost of course materials as low as possible, and how my passion for OEP affirms my commitment to sustainable teaching.

I also worked with senior marketing students to develop a code of conduct for their marketing consulting projects. For these projects, students work with a client organization over the term to develop a marketing plan and formal presentation summarizing their marketing recommendations. I abide by a code of conduct as a Certified Management Consultant and thought that my students should develop their own code to help guide their behaviour in their consulting projects. The code of conduct will be published as an open resource that will be accessible to faculty at other universities who engage in similar consulting project classes.

**Community engaged learning:** I recently designed an advanced marketing strategy course that includes community engaged learning. Some of our senior students have already completed co-op work terms or have part-time or summer work experience, but often they haven't yet developed a complete marketing plan for a real organization when they get to my class.

We focus on a client operating in the nonprofit, social enterprise, or sustainability space. I make the arrangements with the client, and early in the term, the client makes a presentation to the class about their organization and their marketing challenges. Prior to the presentation, I take students through the basics of how to be a marketing consultant.

The students get invested in developing an effective marketing plan because they understand that it has real implications for the organization. The client attends the final presentations and has an opportunity to ask questions and make comments. Because they are presenting to a real client and not just to their professor in a simulated context, students display an increased level of preparation and professionalism compared to other class presentations.

**Alignment of my values and behaviour:** I noticed one theme that kept coming up in classroom conversations about marketing was around authenticity. As consumers and (for some) as future marketers, students in my class liked to talk about the intention behind the decisions companies make. Their comments showed that authenticity was important to them, and I recognized that they were also evaluating my conduct and comparing it to the values that I communicated to them.

At the start of each term, I talk about how my communication style is open and direct. If I am not modelling that behaviour throughout the term, I am not going to be seen as authentic. I have also been reading about reciprocity in teaching—the idea that the same rules you provide to students should also apply to you as an instructor. If you are not flexible about changing the deadline for an assignment (for example), you also have to meet the deadlines you provide to students about when they will receive feedback from you on assignments. Student evaluations of my teaching confirm that this practice is working.

## Learning Activities

There are many ways to develop sustainability-focused learning activities.

**Introducing sustainability and the SDGs:** As an introduction to sustainability and the SDGs, I use a learning activity that references the Lazy Person's Guide to Saving the World, an online resource created by the United Nations for people interested in finding ways to contribute to the SDGs. The activity is intended to deepen students' understanding of sustainability and to help them make their own personal connections to the SDGs.

I start by asking, "Who can tell me what sustainability is?" Most of the answers focus on the environment and include specific sustainable actions, such as biking to work or recycling. Then I ask how they might measure sustainability; often the answers include buzzwords like "net zero" and "eco-friendly." I ask if anyone has heard of the SDGs; most have not.

I then provide an overview of the SDGs, share some of the measures and targets, and include samples of the Canadian targets to ensure a local perspective. I engage the students in a think, pair, share exercise where they read about the SDGs on the UN website and identify three SDGs they have a personal connection to. Then students share their findings—including their reasons (their why) for each of their choices—with a partner.

Afterwards, as a large group, I get them to submit their top three SDGs in ranked order. I comment on the most popular choices (often not related directly to the environment), and I refer back to our earlier discussion around what sustainability is and how we now have a

much broader definition of what it includes. Finally, I tie the SDGs back to our discipline and ask students which of the SDGs they think are most relevant in marketing.

**Adapting activities you are already using:** One of the best ways to start developing sustainability-focused learning activities is to assess the activities you are already using and determine where and how you can make connections to the sustainability framework you are aligning with (such as the SDGs). Once I had developed a good working knowledge of the SDGs, I could very quickly connect many of my activities to one or more of the goals.

For example, when I talk about product strategy, I show a video featuring Intermarché, a French grocery store chain, and their “inglorious fruits and vegetables” campaign that is trying to change consumer perceptions around “ugly” fruits and vegetables that are typically unsellable to consumers. I have added a new question about how this campaign might contribute to the SDGs. Students can make connections to SDG 2 (Zero Hunger), SDG 3 (Good Health and Well-being), and SDG 12 (Responsible Consumption and Production). They are also interested in doing more research to understand how selling “ugly” produce in grocery stores might impact carbon footprints in relation to SDG 13 (Climate Action).

One of my most eye-opening experiences was adapting a learning activity related to the fast-fashion company Zara. In the past, I had students read an article that described Zara’s level of efficiency and their ability to pump out thousands of designs and get clothing items on the shelves more quickly than competitors because they own their entire supply chain. I then posed

several discussion questions related to supply chains and marketing.

After reading Aja Barber's (2021) book *Consumed*, I learned how fast fashion contributes to greenhouse gas emissions because the clothes are not meant to last and are quickly discarded. Many fast-fashion items that are donated to thrift stores do not sell, so they are shipped to the Global South and are now accumulating in mountainous landfills. The first time I shared this result of Zara's innovative supply chain in class, I was almost brought to tears because I felt so ignorant, so unaware of the problems I was contributing to.

Now I provide a few examples from other parts of the world, including Sweden, where only 1% of trash goes to landfills because the Swedes are so diligent at recycling, composting, and converting remaining waste into energy. I ask students to discuss in small groups some of the ways they might help with this problem. They come up with lots of great ideas. Some students have noted that, as consumers and as marketers, we don't need to follow the latest trends—which is challenging in the era of influencers hawking things nonstop on social media.

Instead of dropping the Zara learning activity, I found a way to adapt it based on all that I had learned about sustainability. I now take a critical eye to every example I provide to ensure I am sharing a balanced point of view.

**Trying new activities:** After participating in a metaphor exercise with the other Sustainability Faculty Fellows, where we were asked to choose an animal fact card that related to our understanding of sustainability (credit to Aditi Garg for this exercise), I decided to try it in my own classes. To complete the exercise, you need a set of animal fact cards (I got some from National

Geographic) and space to spread them out so students can mingle and look at a few before making a choice. Students are asked to take a few minutes to think about how the facts on their chosen animal card relate to their ideas around sustainability. I provide the example of polar bears—one fact is that they can swim for very long periods of time (days, even). In my opinion, sustainability requires endurance and sustained effort—so the polar bear metaphor works as a good example to explain how I feel about sustainability.

I tried the exercise a few times with undergraduate classes. I gave them a few minutes to develop a couple of talking points to reduce any performance-related anxiety, and the students appeared to enjoy developing and sharing their metaphors. I have also tried it in a graduate-level business class in the MBA program with less success. Students in the graduate class came across as more cynical—they chose animals like chameleons and foxes—with reasoning that sustainability was always changing, hard to pin down, and sometimes seemed to be surrounded with “smoke and mirrors.”

## Assessment Strategies

When talking about assessment strategies, authenticity comes up again. Authentic assessments allow students to apply what they have learned in ways they are likely to use after graduation. To create authentic assessments, you need to understand the skills and competencies students are likely to need after graduation and how they might apply them.

I developed an active learning assignment in my advanced marketing strategy class where students

became experts on a current marketing topic and then taught that topic to the class in 20-minute presentations that had to involve some form of active learning. Many of the students incorporated sustainability concepts into their presentations, which was not required but showed that my inclusion of learning activities related to sustainability in the classroom was having an impact. Going forward, I plan to make sustainability a required component.

In my introductory marketing class, I created an in-class assignment where students designed a sustainable product that would contribute to a circular economy and a marketing strategy to support its launch. This was a good platform to discuss product strategies and new product development, but it didn't focus enough attention on how to effectively market that product to potential consumers. The next time I teach the class I might bring an example of a sustainable product and have students focus on developing a product launch strategy for the existing product—making it more authentic in terms of something they might have to do in their future career as a marketer.

## The Implications

This was the first time I purposefully embedded sustainability into my business classes, and I have already noticed a lot of positive outcomes. Inevitably, after sharing a topic or concept related to sustainability and the SDGs in a class, one or two students would come up to me afterwards and share their passion for a particular sustainability issue. My class was often the first time they

had heard the topic brought up in a business class, and they often shared their appreciation for seeing sustainability-related topics included in the curriculum. Overall, aggregate student feedback indicated that students felt more confident having thoughtful discussions around sustainability and the SDGs after taking my class.

Through the fellowship, I am tasked with supporting my colleagues in business and encouraging them to embed sustainability learning outcomes in *their* classes. It is important to me to show others that it is not an insurmountable task. In fact, several examples of how this can be done are featured in this book. Colleagues are starting to reach out to discuss how they might embed more sustainability content into their classes, and I have been asked to serve on a subcommittee to develop sustainability-related goals in our college strategy. One of those goals will involve embedding sustainability into core classes across all four years of the undergraduate business degree curriculum.

## My Reflections

As I reflect on the experience of embedding sustainability into my business classes, I recognize that there are always areas for improvement. For example, I plan to incorporate additional formative assessments of sustainability knowledge during the term to ensure students can get feedback before the final exam. I'm also looking for ways to give students more real-world applications of the concepts we're talking about in class.

I plan to increase my own focus on sustainability-



related research projects to be seen as a credible sustainability scholar. I believe students will be more receptive if they can see that my interest in the subject is authentic and demonstrated in various aspects of my personal and professional life.

The biggest challenge I have faced in this journey is having enough time. I have been striving to implement many changes in my classes and in my college, but I have a seven-course teaching load in addition to other job requirements. I did not feel that I had enough time to achieve everything I set out to do. However, I know I need to be kind to myself and be at peace with the place I am at right now. You can only change what is in front of you, going forward with the experiences and lessons that you have learned along the way.

## Lessons Learned

### Change Takes Longer Than You Expect

I have learned many lessons throughout this process. As someone who is self-motivated and likes to get things done, I have had to accept that change (particularly large, department- and college-wide change) takes longer than you might expect. It takes time to develop new content, new activities, and new ways of thinking about teaching.

I had a very long list of things that I wanted to change in the classes I teach, and midway through the term I had to accept that I wasn't going to achieve everything I wanted to achieve in the first year.

## Students Bring Their Own Perspectives

Before this experience, I naively assumed most students would be interested in doing their part to “save the world.” I now see that students come to my class with a variety of perspectives, and not all of them will buy in right away. This can be an opportunity for healthy discussion and debate.

In discussions around accountability for sustainability, I have seen students put sole responsibility on corporations because of their resources and the larger impacts of their activities. I try to anticipate these perspectives and come prepared to discuss them when they come up in class. I talk about how corporations are still led by people, and leaders can have impact as individuals.

Whenever an instructor modifies pedagogy, you need to anticipate that those changes won’t show up the same way in every class you teach. As I gained experience using sustainability learning activities, examples, and assessments in multiple sections of a class, I was reminded of how differently they can land depending on the culture and composition of students in a particular class. Some that were hits in one section were misses in another. And that’s okay—it’s better to keep learning and take another shot than to get discouraged or to throw something away because it didn’t work well the first or second time.

You can’t get everything perfect the first time around. Teaching about sustainability is ever evolving, and I am shifting my focus to the journey instead of trying to reach a certain destination.

## No One Can Do This Work Alone

No one can do this work alone. Having a supportive peer network at my university was invaluable in keeping me motivated and accountable.

My department and college have been extremely supportive—I think the timing was right to invest in these types of initiatives. There was also formal recognition of my work, which increased my profile within my college and gave me a platform to work with others in my college toward embedding sustainability in our business programs. It would be much more challenging to make change happen if I didn't have that support.

With funding from the SFF program, I was able to host an SDG multiplier training session in my college, and I was happy to see representation from all of our departments. It affirmed that we have a committed group of people who support our increasing focus on sustainability.

I didn't feel that I could commit the time to train a teaching assistant to support my sustainability work during the year, so I didn't seek one out. In hindsight, it would have been wonderful to have access to a teaching assistant who was already educated in sustainability. Perhaps investing in someone to take the same training that the fellows do would be an interesting way to approach this.

Overall, the SFF program was a great way to bring together faculty from different disciplines to learn from and share with each other. The fellowship might not have been successful without facilitators who were well

versed in sustainability to lead us through the development of our courses.

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## AUTHOR BIOGRAPHIES

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In alphabetical order:

Aditi Garg helps educators create courses aligned with social, environmental, and economic sustainability. She emphasizes reflective teaching practices that are inclusive and responsive. Aditi is committed to environmental protection and addressing settler-Indigenous relations, seeking equitable changes in power structures through her work in tertiary education.

Eric Micheels is an Associate Professor in the Department of Agricultural and Resource Economics and a Fellow in Agribusiness Cooperatives at the Centre for the Study of Cooperatives at the University of Saskatchewan. Eric's research interests are in farm and agribusiness management, marketing, strategy, and innovation. He is particularly interested in how firms search for and exploit organizational and technological innovations to improve operational and financial performance. Eric teaches courses in farm management, agribusiness marketing, new business development, and agribusiness strategy. He has received several teaching awards while at the University of Saskatchewan, including the USSU Teaching Innovation Award, the Provost's College Award for Excellence in Teaching, and the Dean's Teaching Excellence Award. Eric received a B.S. in Agribusiness with a minor in Agronomy from the University of Wisconsin-River Falls in 2001, a Master's Degree in Agricultural and Consumer Economics from the University of Illinois in 2004 and a

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Brooke Klassen is an Assistant Professor in the Edwards School of Business at the University of Saskatchewan. Her teaching specializations include marketing strategy, business strategy, decision making, venture development and entrepreneurship. Prior to becoming a professor, she was a senior administrator in the Edwards School of Business and led a team of student services staff for eight years. Brooke is a Certified Management Consultant (CMC) and has completed over 100 projects in the areas of strategy, governance, organizational change and communications. Her client list includes private, public, government and Indigenous organizations from a variety of industries. She is also an accomplished author and her work has been published in several well-respected peer reviewed journals. Her current research focuses on telling the stories of female CEO's (in relation to SDG 5) and highlighting the gender biases faced by women in many industries. In her teaching, research and community building work, Brooke is working on authentically integrating Indigenous content into her classes, writes teaching cases that showcase the untold success stories of Indigenous Peoples and Nations, and volunteers her time to a foundation that funds early education programs so that all children in Saskatchewan can have an equal start.

Heather M. Ross has worked in the area of educational development since 2005. She advises instructors on all aspects of course design and spearheads the open educational practices (OEP) work at the University of Saskatchewan. She firmly believes that open educational

resources, such as this book, and other forms of OEP can and should play a key role in making education more inclusive and accessible while integrating ways of addressing local and global problems, such as climate change, into curriculum across the disciplines.

Kate Congreves is an Associate Professor in the Department of Plant Sciences and a Sustainability Faculty Fellow at the University of Saskatchewan. She leads the *Environmental Agronomy & Horticulture* research program and has expertise in soil health, nutrient cycling, and greenhouse gas emissions. Together with her students and research team, her work is aimed at understanding the mechanisms that regulate nitrogen use efficiency and the implications for agroecosystem functioning. She is an award-winning researcher and teacher; and has authored ~ 50 peer-reviewed publications including invited contributions and highly cited papers. She teaches undergraduate and graduate courses in climate smart agriculture, sustainable horticulture, and vegetable agronomy.

Shannon Forrester holds a teaching focused faculty position and instructs numerous undergraduate courses in the College of Kinesiology. She is a passionate, award-winning instructor with eighteen years of teaching experience in higher education. Through her role as a lecturer and clinical exercise physiologist, she advocates for and promotes physical activity to enhance the full spectrum of health and wellness, whether that be physical, social, mental, or even environmental. Her goal for sustainability in teaching and learning is for students to demonstrate respectful perspective taking and to reflect on the way in which the discipline of Kinesiology can support the SDGs. More specifically, she would like

students to identify the personal and professional role they will play in enhancing the health and wellness of their personal self, their communities, and the planet. Shannon's academic interests outside of sustainability include the Scholarship of Teaching and Learning with a particular focus on student and instructor mental health. In her spare time, you will find Shannon enjoying the outdoors. She is kept busy keeping up with her active family which includes her husband, two teenage boys, and an energetic black goldendoodle.

Tate N. Cao is an Assistant Professor in the Ron and Jane Graham School of Professional Development at the University of Saskatchewan. He is the La Borde Chair in Engineering Entrepreneurship and teaches courses on engineering technology management, product design, and entrepreneurship. His research interests include 3D printing in tissue engineering and healthcare, smart farming technologies, and entrepreneurial practices. He has founded and directed the SIGMA Educational Skill Accelerator program, and serves on several boards, including the Asian American Innovation Alliance, Co. Learn, Tech Innovation and Engineering Entrepreneurship group at CEEA and the Pan Canadian Smart Farm Network. Prior to joining USask, he practiced intellectual property law and built and managed startup companies. Prof. Cao received his bachelor's degree in Biomedical Engineering from Beijing Institute of Technology and his Master's in Biomedical Engineering and MBA from the University of Saskatchewan. He is one of the six USask Sustainability Faculty Fellow and leads the Smart Farming Initiative at the College of Engineering.

Ulrich Teucher is an Associate Professor in the



Department of Psychology and Health Studies, at the University of Saskatchewan. Initially, Teucher had trained as a male pediatric nurse, working in a pediatric cancer ward in Hamburg, Germany. Following immigration to Canada, Teucher obtained a BA in English and Germanic literatures, before entering graduate studies in Comparative Literature, in the fields of Literature and Psychology, all at the University of British Columbia. In an interdisciplinary doctoral dissertation, entitled “Writing the unspeakable: Metaphor in cancer narratives”, Teucher established a therapeutic psychopoetics of metaphor in cancer discourse. Throughout his work and research, he has been developing interdisciplinary, culture-sensitive methodologies that often combine qualitative and quantitative analyses. Teucher has held tri-council research grants and is a member on a decolonized research team on Inflammatory Bowel Disease among Indigenous Peoples. Currently, Teucher chairs the Health Studies Program, teaching his courses with an overall focus on Sustainability, Health, and Care. Recently, Teucher was awarded a Sustainability Faculty Fellowship. Teucher, whose family lives in Germany, views himself as a visitor on the lands and waters, and under the skies, of Saskatchewan, striving to decolonize his worldviews and being a good neighbour with the Indigenous peoples of this land.